PA's Efforts to Address Operation, Maintenance and Replacement of AMD Passive Treatment Systems

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The Need?

Over $60 million worth of publicly funded AMD passive treatment facilities currently in operation in PA. Source: OSM AMD Databas

The Need

- More than 275 AMD passive treatment systems project sites are known to exist in Pennsylvania.
- State funding through the Growing Greener and Growing Greener II program ($625 million over 6 years)

The Need

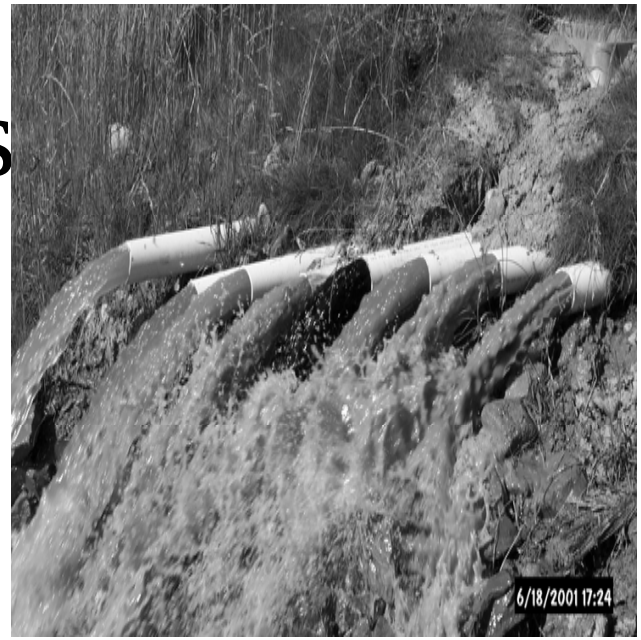
- Original O,M,&R Workgroup formed in 2001-Recommendations made to Department Secretary
- Group revived/expanded in 2003 with new recommendations
- Group focused on AMD needs, but also included O,M, &R concerns on Non-AMD structures

Why Operation and Maintenance?

- “An ounce of prevention is worth a pound of cure.” - Ben Franklin
- Systems that are not maintained are destined to fail!!
- Failed systems can have significant environmental consequences.

What Does O, M & R Involve?

Operation Examples



- Inspections
- Litter control
- Vegetation control
- Mechanical maintenance (flushing)
- Insect and vector control
- Monitoring – water sampling
- Physical stability and erosion control

Routine Operations: Treatment System Sampling

Routine Operations: Debris Removal

Routine Operations: Flushing

Maintenance Examples

- Dredging and sediment removal
- Repairing damage after major storm events
- Repairing cracks or leaks
- Repairing damage from vandalism
- Adding limestone, compost, sand, or gravel
- Adjusting grade or outlet structures

Maintenance: Baffle Repair

Maintenance: Influent Modification

Oven Run Site B: Modify Inlet Structure

Oven Run Site B: Accumulated Iron

Oven Run Site B: Iron Removal

Oven Run Site B: Compost Replacement

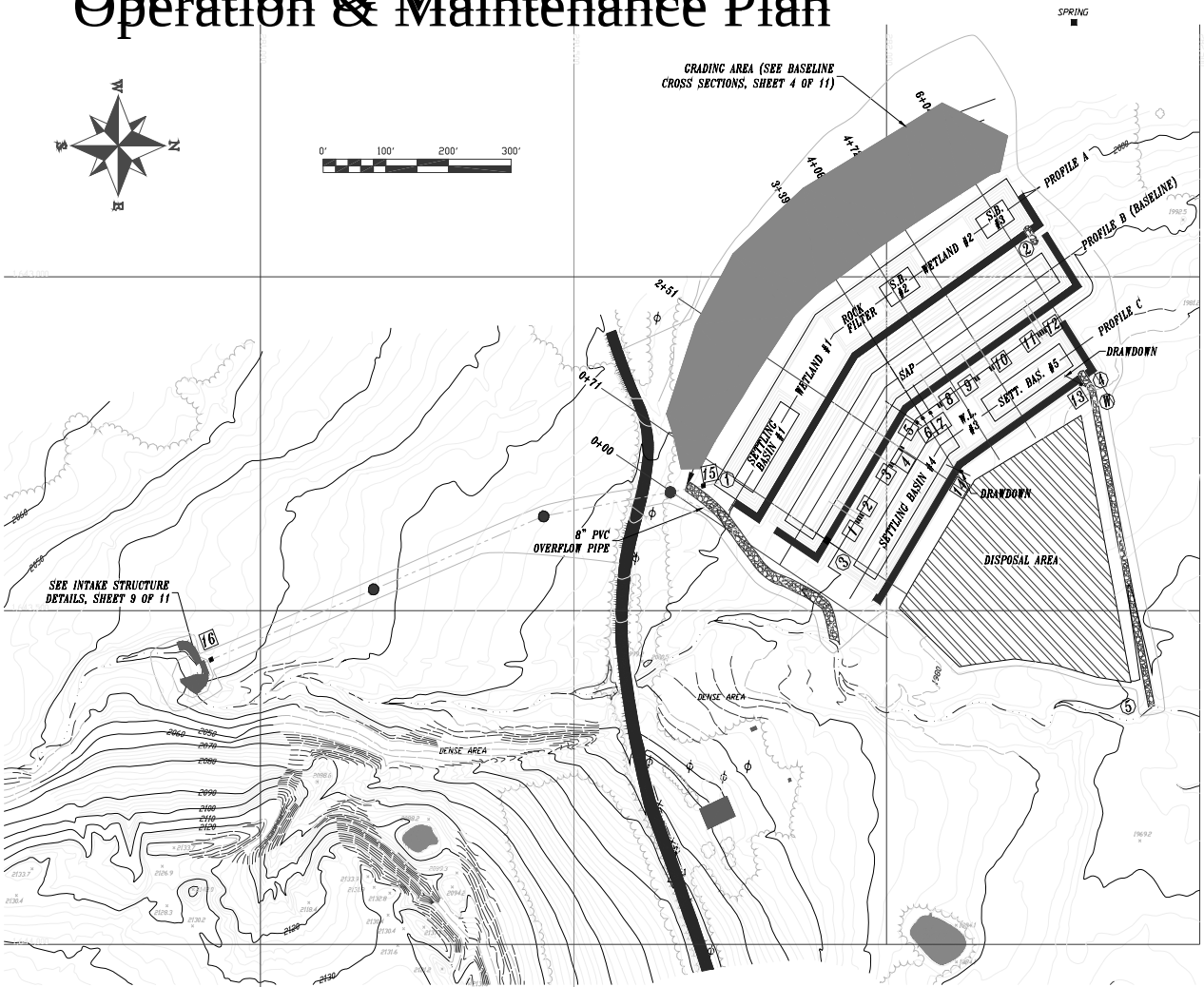
Audenreid Treatment System

Replacement Concerns

- Estimate BMP design life
- Incorporate new technology
- What is the cost to replace?
- Who will replace?

Operation & Maintenance Plan

Operation & Maintenance Plan



FLUSHING SEQUENCE

Step 1 – (Draw down of settling basins) Open valves #13 and #14. Allow settling basins #4 and #5 to drain down as far as the opening of valves #13 and #14 will allow. Note – this draw down of the water in these settling basins may take a day to be completed.

Step 2 – Close valves #13 and #14.

Step 3 – Top flush – open valves #2, #4, #6, #7, #9 and #11. This step will flush the upper layer of rock in the SAP and the rock filter in the upper treatment impoundment. Allow these valves to remain open ½ hour after the flush water has cleared.

Step 4 – Close valves #2, #4, #6, #7, #9 and #11.

Step 5 – Observe the water level in settling basins #4 and #5. If these basins have filled to within 2 feet of the normal water elevation, the water elevation must be lowered again so that there is adequate capacity to contain water from the bottom flush (step 6). If adequate capacity for step 6 is not available when step 4 is completed the flushing sequence will be suspended for 1 day to allow pollutants to settle. Upon resumption of flushing, the water elevation in the settling basins shall be lowered as outlined to step 1. Once this is completed, continue with step 6. If adequate capacity exists in the settling ponds for the bottom flush water, continue with step 6.

Step 6 – Open valves #1, #3, #5, #8, #10 and #12. Allow these valves to remain open for ½ hour after the flush water clears.

Step 7 – Close valves #1, #3, #5, #8, #10 and #12.

WATER SAMPLING POINTS

#1 – Raw untreated water where it enters settling basin #1

#2 – Outflow from sediment basin #3

#3 – Outflow of the SAPS

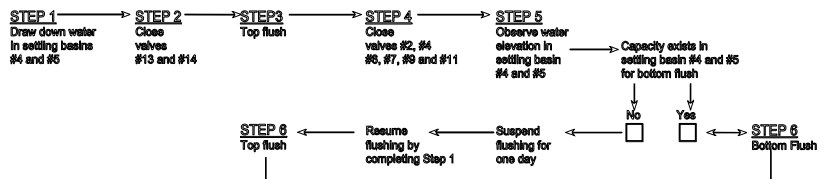
#4 – Outflow from settling basin #5

#5 – Outlet of rock waterway #3

LEGEND

These standard symbols will be found in the drawing.

- DIVERSION
- FLOW MEASUREMENT WEIR
- WATER LEVEL CONTROL STRUCTURE
- 12" GATE VALVE
- 8" GATE VALVE
- WATER SAMPLING LOCATION



What Does O, M & R Cost?

Calculating O, M & R Costs

- **Calculation of factor**: [(actual total O,M&R costs)/(life of system)/(construction cost)] X 100
- **Calculated an Average O, M & R Factor of 4%**
- **Use of factor:** Construction Cost X (O,M&R factor) = average annual O,M&R for project
- **Example:** $200,000 project with 4% factor will cost an average $8,000 per year for O,M&R

Average Annual Factors for AMD Treatment Systems *

- Vertical Flow Systems..... 5%
- Anoxic Limestone Drain Systems..... 4%
- Compost Anaerobic wetlands..... 4%
- Pyrolusite© Systems..... 3%
- Open limestone channels..... 1%
- Lime sand addition programs..... 33-50%
- Automated lime doser..... 13%

* Annual percentage of construction costs

Breakdown of O, M & R Costs for Vertical Flow Systems

- Routine operations (sampling,..... 20.0% inspections, flushing)
- Water sample lab analyses 10%
- Maintenance – repairs & supplies 30%
- System reconstruction..... 40%

Note: This is a breakdown of the expected 5% of construction costs needed for annual maintenance of vertical flow systems

How Can Costs Be Reduced?

- Sponsor who takes on projected O & M activities would lessen the O, M & R costs by 20%-60%
  - Examples:
    - Sponsor handles routine operation and maintenance (monitoring, sampling, etc.)
    - Major maintenance and replacement costs are based on government bid projects; sponsors who are creative with local resources may decrease these costs

Guiding Principles for Projects in Pennsylvania

*True Sustainable Operation, Maintenance & Replacement is based on **LOCAL COMMUNITY** Ownership & Involvement*

Workgroup Breakdown of Responsibilities

- Routine Operations (20%) : Local Group
- Lab Analyses (10%): DEP (or other gov't source)
- Maintenance (30%): Gov't & Local Group
- Replacement Cost (40%): Gov't
- Total Cost: Gov't – 65%,
  Local Group – 35% (can be in-kind match)

Revised 11/5/03 Recommendations:

Recommendation #1: Funding

- Funding now available through Growing Greener for non-routine repairs and replacement
- Department is looking very seriously at additional ways to provide sustainability.

Recommendation #2: Quick Response

WPCAMR has received a $350,000 grant under this year's Growing Greener II funding to establish and administer a Quick Response program.

Recommendation #3: Lab Analysis

WPCAMR received a Growing Greener grant last year to establish and administer a lab analysis funding program for watershed groups to monitor their treatment system.

Web Sites

http://www.dep.state.pa.us/dep/deputate/minres/bamr/amd/science_of_AMD.htm

http://audenreid.blogspot.com/

http://www.orangewaternetwork.org/

http://www.amrclearinghouse.org/

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